APHANES MICROCARPA (BOISS. ET REUT.) ROTHM. IN BRITAIN

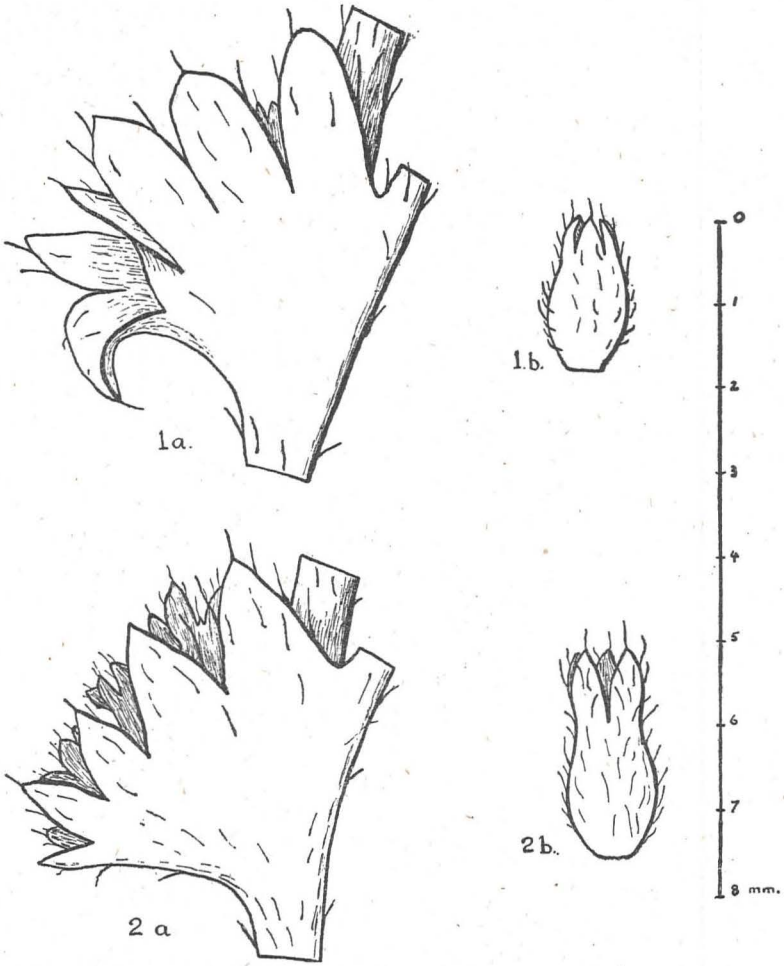
By S. M. Walters.

The Linnaean genus *Aphanes* was shown by Rothmaler (1935; 1937) to consist of a number of species of small annual plants, of which the most widely distributed is *A. arvensis* L. (1753, *Sp. Plant.*, ed. 1, 123) (*Alchemilla arvensis* (L.) Scop.). Until this work was published, it had been assumed that all N. European material belonged to this Linnaean species; but Rothmaler was able to show that *Aphanes microcarpa* (Boiss. & Reut.) Rothm. (1937) (*Alchemilla microcarpa* Boiss. & Reut., 1842, *Diagn. Hisp.*, 11) first described from Spain, actually occurred quite widely in Europe. In 1937, Rothmaler and Hylander published a joint paper describing the two species in Sweden; this was followed by a paper on the Danish material of *Aphanes* by Gudjonsson (1941); and finally Rothmaler (1944) published an account of *Aphanes* which included a record for *A. microcarpa* from " Oxford, England " (presumably based on material in continental herbaria). Inspection of British herbarium material has shown that, as in Sweden and Denmark, *A. microcarpa* is actually widespread in Britain, where it has never previously been distinguished from *A. arvensis*.

The most reliable characters on which to distinguish *A. microcarpa* from *A. arvensis* are those of the shape and size of the fruiting urceole crowned by the persistent calyx. In *A. microcarpa* the urceole + calyx is about $\frac{2}{3}$ as long as in *A. arvensis* (" fruits " of *A. microcarpa* are 1.4-1.8 mm., and of *A. arvensis* 2.2-2.6 mm. in length). The calyx-teeth themselves are very much smaller in *A. microcarpa*, and usually converge, whereas in *A. arvensis* they are more conspicuous and spreading from a distinct " neck " at the top of the urceole (cf. fig. 1). An additional character is provided by the stipules surrounding the inflorescence, which are much more deeply and narrowly lobed in *A. microcarpa* than in *A. arvensis*; the lobes in *A. microcarpa* are typically finger-like, whilst those of *A. arvensis* are triangular. The whole inflorescence has a different appearance in the two species; in *A. arvensis* the calyx-teeth can usually be seen under a lens projecting beyond the stipule lobes, whereas in *A. microcarpa* the lobes normally exceed and cover the whole inflorescence.

There also exists a general difference in habit between the two plants, which is sufficiently clear to enable a preliminary sorting of herbarium material to be made, using the habit character only, with considerable success. *A. microcarpa* is commonly a slender plant, with rather long internodes, and the stouter, more vigorous specimens in herbaria almost invariably turn out to be *A. arvensis*. It was in this connection interesting to find the following note attached to a (rather poor) specimen of *A. microcarpa* in Herb. Mus. Brit. collected

in 1853 from Wordwell Common, near Bury St Edmunds, W. Suffolk:—"*Alchemilla arvensis*—much slenderer in growth than the ordinary form, and very distinct in appearance." There is also a slight colour difference which may be associated with hairiness; *A. microcarpa* is usually a pure green, as opposed to the grey-green of *A. arvensis*. Both species vary considerably, however, in these characters of habit and hairiness—a variation presumably largely phenotypic in origin—and too much reliance should not be placed on such characters for identifica-



1. *Aphanes microcarpa*. 2. *Aphanes arvensis*. a. Stipule enclosing inflorescence. b. Single urceole, detached. (Material from Lincolnshire).

tion. As would be expected, specimens with no developed inflorescences present considerable difficulties in determination, and it seems that the stipule character is not reliable in the purely vegetative condition; as, however, the plant is not commonly collected without flowers, herbarium specimens can be identified with little difficulty. A small number of specimens have been found which possess somewhat intermediate fruit and stipule characters, but until cultivation experiments have given some information as to the range of variability within each species, the exact status of such plants cannot be decided.

Gudjonsson (1941) investigated the cytology of the two species in Denmark, and found 2n = 16 for *A. microcarpa*, whilst a count for *A. arvensis* gave 2n = 48, agreeing with Böös' determination of n = 24 for *A. arvensis*. It should be noted, however, that both Murbeck (1901) and Strasburger (1904) had found n = 16 for *A. arvensis*; and Gentscheff and Gustafsson (1940) give 2n = 49-50. In a recent paper, Gustafsson (1948) states that *A. microcarpa* " is sexual and diploid " with 2n = c. 16, whilst *A. arvensis* " is polyploid with 2n = c. 48 but reproduces agamospermously." Further cytological work seems highly desirable.

The data so far accumulated for the distribution of the two species in the British Isles suggests rather strongly that, as Gudjonsson showed for Denmark, *A. microcarpa* is more or less restricted to acid soils, whilst *A. arvensis* appears to be indifferent to soil acidity. Thus all herbarium material yet seen from Cambs. (v.-c. 29), which has very little acid soil, is *A. arvensis*, whilst *A. microcarpa* and *A. arvensis* are both common on acid sandy soils around Lincoln (v.-c. 54). The vice-comital distributions are, of course, as yet very incomplete, and much more information on the occurrence of the two species is required; detailed studies of mixed populations would be particularly interesting in that they may show ecological differences.

Vice-Comital Distribution.

Most of the records are from the following herbaria: British Museum (Natural History) (B), Cambridge (C), Kew (K), Oxford (O). No attempt has been made to cite the earliest record for each v.-c.

Aphanes arvensis L.

V.-c. 1. W. Cornwall; Padstow, *E. Thurston*, 1918, (K).
3. S. Devon; East Allington, near Totnes, in light arable field with *A. microcarpa*, *S. M. Walters*, 1948.
4. N. Devon; Saunton Sands, *L. H. Pegler*, 1922, (B).
6. N. Somerset; Clevedon, *W. H. Painter*, 1881, (B).
9. Dorset; Swanage, *H. N. Ridley* and *W. Fawcett*, 1882, (B).
10. I. of Wight; Shanklin, *H. Trimen*, 1860, (B).
11. S. Hants.; Lyndhurst, *S. H. Bickham*, 1900, (C).
12. N. Hants.; Basingstoke, *R. S. Hill*, 1860, (K).

15. E. Kent; Grove Wood, Darland, Gillingham, *J. B. Marshall*, 1938, (B).
17. Surrey; West Farleigh, Mickleham, *J. F. Young*, 1835, (B).
18. S. Essex; near Chingford, 1884, (Herb. Marshall, C.).
20. Herts.; Watford, *T. Moore*, 1847, (B).
21. Middlesex; Newington, *E. Ballard*, 1839, (B).
22. Berks.; Boar's Hill, *G. C. Druce*, 1893, (O).
23. Oxford; several sheets, (O), e.g., dry field near Headington Wick, *H. Baker*, 1893.
24. Bucks.; High Wycombe, *M. A. Lawson*, 1866, (O).
25. E. Suffolk; Southwold, *Julia Grubbe*, 1879, (K).
26. W. Suffolk; Cavenham, fallow field, *A. J. Wilmott*, 1911, (B).
27. E. Norfolk; Sprowston, *E. F. Linton*, 1885, (B).
29. Cambs.; several sheets, (C), e.g., Gog-Magog Hills, 1826: Newmarket Heath, 1827, *J. S. Henslow*.
30. Bedford; Studham, *E. Milne-Redhead*, (5533), (K).
32. Northants.; near Kingsthorpe, *M. Shepard*, 1873, (B).
34. W. Gloucester; Tutshill, near Chepstow, *E. S. Marshall*, 1908, (C, B).
35. Monmouth; near Windcliff, *H. W. Monington*, 1889, (B).
36. Hereford; Tedstone Delamere, *T. S. Lea*, 1890, (B).
38. Warwick; Milverton, Leamington, *C. Bailey*, 1879, (B).
41. Glamorgan; Rhossili, Gower, *H. J. Riddelsdell*, 1910, (B).
42. Brecon; Cefn, *H. J. Riddelsdell*, 1903, (B).
54. N. Lincs.; fresh material from Holton-le-Moor, with *A. microcarpa*, *Miss E. J. Gibbons*, 1948.
55. Leicester; *J. G. Gillman*, 1931, (B).
57. Derby; Dovedale, *A. J. Wilmott*, 1933, (B).
58. Cheshire; Bowden, *S. H. Bickham*, 1857, (C).
60. W. Lancs.; Aldcliffe, *H. B. Fielding*, 1834, (O).
62. N.E. York; near Ganthorpe, *J. F. Young*, 1845, (B).
63. S.W. York; Sheffield, *W. Newbould*, 1834, (B).
64. M.W. York; Roundhay, Leeds, *A. E. Bradley*, 1902, (B).
66. Durham; near Sunderland, *E. Backhouse*, (B).
68. Cheviotland; Ross Links, *H. E. Fox*, 1885, (O).
69. Westmorland; Arnside, *W. C. Worsdell*, 1894, (K).
81. Berwick; (? loc.) *J. Anderson*, (B).
83. Edinburgh; near Balerno, *Bayley Balfour*, 1871, (O).
86. Stirling; grassy bank below Stirling Castle, *J. F. Duthie*, 1875, (B).
93. N. Aberdeen; near Peterhead, *Brand*, 1833, (B).

S. Jersey; St Aubins and First Tower, *Lester-Garland*, 1899 (K): Alderney; Mannaz Quarry, *Jackson* and *Airy Shaw*, (143), (K).

H.39. Antrim; Bushmills, 1881, *Herb. T. B. Cartwright*, (O).

APHANES MICROCARPA (B. et R.) Rothm.

V.-c. 2. E. Cornwall; St Stephen's, *T. R. A. Briggs*, 1871, (B).
3. S. Devon; East Allington, near Totnes, with *A. arvensis* (q.v.).
6. N. Somerset; Keynsham, Bristol, *H. S. Thompson*, 1922, (B, C).
9. Dorset; Verwood, *E. F. Linton*, 1897, (B).
10. I. of Wight; Alum Bay, *H. E. Fox*, 1910, (O).
11. S. Hants.; Bournemouth, *C. E. Palmer*, 1904, (O).
12. N. Hants.; Shortheath, Selborne, *J. Vaughan*, (O).
13. W. Sussex; Midhurst, *H. E. Fox*, 1875, (O).
17. Surrey; Chart Park, near Dorking, *A. J. Wilmott*, 1914, (B).
21. Middlesex; Hounslow Heath, *J. H. Morgan*, 1894, (B).
23. Oxford; Nettlebed Common, *A. French*, 1876, (B).
24. Bucks.; gravel pit, Burnham Beeches, *A. P. Conolly*, 1945, (fide T. G. Tutin; Herb. Univ. Coll. Leicester).
26. W. Suffolk; Icklingham, *A. J. Wilmott*, 1929, (B).
28. W. Norfolk; Sandringham, light sandy soil, open places in woods, *C. E. Hubbard*, (K).
34. W. Gloucester; Chase End Hill, *H. J. Riddelsdell*, 1909, (B).
37. Worcs.; open woodland track near R. Severn, Bishop's Wood, *Miss E. J. Gibbons*, 1949.
42. Brecon; Nant Gwyllt, *A. Ley*, 1881, (B).
49. Caernarvon; Dinas Dinorwic, *C. C. Babington*, 1847, (C).
54. N. Lincs.; fresh material with *A. arvensis* (q.v.).
55. Leicester; Groby Pool, *T. G. Tutin* (fide T. G. Tutin; Herb. Univ. Coll. Leicester).
58. Cheshire; Oxton Common, *J. S. Henslow*, (C).
60. W. Lancs.; Aldcliffe, *H. B. Fielding*, 1834, (O).
62. N.E. York; Pilmoor, *T. J. Foggitt*, 1934, (B).
63. S.W. York; Doncaster Moor, waste ground, *T. J. Foggitt*, 1908, (B).
71. I. of Man; Gat-y-Whing, Andreas, *C. I. Paton*, 1927, (B).
73. Kirkcudbright; Kempleton Road, Tongland, *F. R. Coles*, (B).
75. Ayr; " waysides, Ayrshire," *Herb. H. E. Fox*, (O).
83. Edinburgh; fields, Water of Leith, *J. F. Young*, (B).
90. Forfar; Kinnordy, *Lyell*, (B).
91. Kincardine; Kingcausie, *J. B. Syme*, 1850, (B).
92. S. Aberdeen; Crathie, Braemar, *A. Croall* (Plants of Braemar, 518), 1856, (C).
96. Easterness; Kincraig, *A. Somerville*, 1891, (B).
97. Westerness; Glen Roy, *G. C. Druce*, 1891, (O).
103. Mid Ebudes; Strongalsh, Mull, *G. Ross*, 1876, (B).
105. W. Ross; Strome Ferry, *E. F. Linton*, 1884: Erradale in Gairloch, *A. J. Wilmott*, 1936, (B).
107. E. Sutherland; near Dornoch, *A. J. Wilmott*, 1919, (B).
112. Shetland; Sandwick, *W. H. Beeby*, 1896, (B).

S. Jersey; sandhills north of Le Ouainé, *A. J. Wilmott*, 1933, (B).
H2. N. Kerry; Killarney, roadside between Muckross and Brickeen, *H. N. Ridley*, 1883, (B).
H16. W. Galway; Roundstone, *C. Bucknall*, (K).

The following plants possess somewhat intermediate characters, and could not be satisfactorily classified:—

V.-c. 17. Surrey; Kingston Vale, cultivated ground, *H. E. Fox*, 1913, (O).
36, 37. Hereford and Worcester; "N. end of Malverns," *A. J. Wilmott*, 1912, (B).
43. Radnor; Stanner Rocks, *A. J. Wilmott*, 1932, (B).
96. Easterness; Cannich, *A. J. Wilmott*, 1936, (B), (*A. arvensis* ?).
109. Caithness; near site of Loch Durran, *A. J. Wilmott*, 1935, (B), (*A. arvensis* ?).
111. Orkney; border of oatfield, Mainland, *H. H. Johnston*, (4079), (several herbaria), (*A. microcarpa* ?).

NOTE.

The case for retaining *Aphanes* L. (1753, *Sp. Plant.*, ed. 1, 123) as a separate genus from *Alchemilla* L. is stated at length in Hylander and Rothmaler's paper (1937), where a historical review of the different treatments is also given. Rothmaler himself originally treated *Aphanes* as a subgenus of *Alchemilla* (Rothmaler, 1935), a treatment which I followed for an arrangement of the British species of *Alchemilla* (1948); but he later (1937) raised *Aphanes* to its original status of a separate genus. I have decided to follow Rothmaler's later decision in view of the very considerable differences between *Aphanes* and *Alchemilla* proper. Of these differences, the most important are the characters of the androecium, which in *Aphanes* consists of a single stamen with extrorse anther inserted on the inner margin of the disk opposite a sepal, whilst in *Alchemilla* there are four stamens with introrse anthers inserted on the outer margin of the disk and alternating with the *sepals*. In addition, the weak annual habit of *Aphanes* contrasts sharply with the perennial rhizomatous habit of *Alchemilla*.

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